

of the book. It should be a guarantee, for instance, of a well-balanced treatment of all subjects from A to Z. Not a few great works of reference, including the encyclopædia itself in former editions, appearing volume by volume over the period of a generation, have shown signs (so to speak) of fatigue in about the last quarter of the alphabet. In some instances it may have been financial fatigue, in others merely the realisation that the proportions of the first few volumes, if maintained, would bring the completed work to an impossible bulk. But the promise of simultaneous publication disposed of any such possibilities in the present edition, for in order to carry it out the cost must have been counted and the scheme laid out, not volume by volume, but for the whole work at once. And this treatment of the whole connotes the similar treatment of every part, not merely as regards the laying-out of each group of main and subsidiary articles, but as regards questions of general policy. The illustrations are a case in point. The editorial ideal has been to illustrate where illustration is a genuine assistance or supplement to textual description, and only in that way, not including pictures simply for their own sake. So every suggestion or possibility of illustration has been brought, so to say, under one standard test.

It is the same with the maps. The tenth edition set the precedent of an atlas volume. The editors of the eleventh have put this precedent aside. Their view may be open to criticism; there are undoubtedly arguments in favour of an atlas volume. But the advantage of having the article on each important territory accompanied by its appropriate map has been considered stronger. Moreover, the possibility of allocating to each such territorial article its map according to a graduated scale—double-plate, single-plate, or small text map, coloured map or black only—has given the geographical editors an opportunity in the direction of proportional treatment which would have been precluded by the construction of an atlas, at any rate of the size of an encyclopædia scheme. At the same time, the proper indexing of the maps has been undertaken, so that they may fulfil the atlas-function. Here the editorial ideal has been to set before the cartographers either the actual text of the articles to be illustrated or the most precise instructions as the scope and orthography of each map, to carry out the indexing in the editorial office, and to apply as part of that process a careful system of checking and correction. This method presupposes the manufacture of a complete series of new maps for the book; there has been no use of cartographers' stock.

Mention of map-indexing leads to the subject of text-indexing. The indexing of the tenth edition was a great conception, and of course added enormously to ease of reference. But it was an after-thought, whereas the work of preparing the index entries for the eleventh edition has proceeded concurrently with practically the whole work, the pagination being added at the last. It has been possible, therefore, to put the indexing to an editorial use, in this way—that when the index-references on any subject were put together, they have been found sometimes to indicate

the existence of unnecessary duplications or of inconsistencies of view or even of fact, between articles by different authors—such duplications or inconsistencies as could not possibly have been discovered by any other editorial method.

The eleventh edition bears a clear international imprint. If the conception of certain articles dealing with subjects of world-wide interest be compared in this and former editions, evidence will be found of another editorial ideal. For example, on matters of government, sociology, law and the like, it has been sought to explain not British practice only, but American and foreign as well. The work has an extra-British reputation already; it has palpably been attempted to justify and increase that reputation. The multinational list of contributors illustrates the same ideal.

It has been said above that one tradition of the *Encyclopædia Britannica* is a high literary standard. This has been preserved. No man reads a dictionary or ordinary book of reference for its own sake as literature. The editors of such works have no room to offer their contributors any literary opportunity. But while it would be unfair to forget that the problem of the best utilisation of available space must have been as constantly present to the editor of the *Encyclopædia Britannica* as to the printer of a finger-prayer-book, the fact remains that twenty-eight large volumes do offer a literary opportunity; if they did not, they would not justify their existence. On any subject capable of literary treatment (and few are not) the *Encyclopædia* appears to apply that treatment; it is impossible to turn many pages (except one should light on such a topic as higher mathematics) without reaching some subject or fact which is presented so as to arouse the casual, as distinct from the special, interest. The India-paper edition makes it possible to do this without physical discomfort, and the production of that edition is in itself an unprecedented achievement, for it must necessarily presuppose that paper-mills of some half-a-dozen countries have been laid under contribution to meet a demand of such magnitude, and that the printing must have been carried out with a rapidity the possibility of which, as applying to India paper was probably unrealised before. On these grounds the manufacture of the book must be pronounced admirable.

Such, then, have been some of the ideals of the editors and publishers. There is every evidence that they view the finished work with enthusiasm, knowing more than others can of the difficulties which have been overcome; judged upon these general grounds, their enthusiasm appears justified.

#### ELECTROMAGNETS.

*Solenoids Electromagnets and Electromagnetic Windings.* By Charles R. Underhill. Pp. xix+342. (London: Constable and Co., Ltd., 1910.) Price 8s. net.

THIS is a book dealing generally with electromagnets, and so far as the author records experimental results will be found useful, but the explanation of the experiments is not given as fully as is desirable

in order that the reader may thoroughly understand the theoretical deductions, and the latter themselves are not always trustworthy. We find a good many quotations with due acknowledgment of articles that have appeared in the *Electrical World* of New York, and if the author had exercised some care in the selection his book could only have benefited by it. Unfortunately, however, the necessity of carefully probing the correctness and relevancy of any article before admitting it into his book does not seem to have occurred to the author, and the result is that we find statements in his book which often are quite useless and sometimes even unintelligible. To give only a few examples. On p. 152 is given a formula for the inductance of a solenoid for which an accuracy of half per cent. is claimed, but the author does not say whether the result is obtained in cm. or in Henry. Moreover, the formula is very cumbersome, and no proof is given. On the next page another formula is wrongly quoted from Maxwell, the exponent for the number of turns per cm. length being given as four instead of two. Also in this case the author does not state whether L is obtained in cm. or Henry.

Another example of the want of criticism on the author's part will be found on p. 32. Here he gives us Mr. H. S. Baker's method of expressing the degree of saturation of the core of an electromagnet. It is as follows:—Draw a tangent to the magnetisation curve at the point for which the degree of saturation is to be expressed as a ratio. Note the length cut off on the B axis by the point of intersection of this tangent. Then the ratio of this length to the value of B at the selected point gives the degree of saturation. Since the characteristic is nearly straight for high values of magnetisation, this method of expressing saturation leads to the absurd result that Baker's ratio becomes actually smaller for very high degrees of saturation. A rule of this kind is absolutely useless and even misleading, and a little consideration on the author's part would have shown him that he had better not include it in his book.

A very bad slip in scientific principles occurs on p. 16. There we are told in an equation that the "Intensity of magnetisation" divided by the magnetic moment gives the "Intensity of the magnetic field." This is quite wrong, for the ratio is simply the inverse of a volume. Again, on p. 25, we are told that "the relation between the strength of a current in a wire and the intensity of the magnetic field or magnetising force is expressed by the equation  $H = 0.2I/a$ ."

This is only true if the wire be infinitely long, but as in what precedes this statement not a word is said about the length of the wire the statement as it stands is misleading, and, in fact, meaningless.

Some of the terms used are not very familiar to English readers. The author talks of Maxwells, Gilberts, and Gausses, but these, although used occasionally by American writers, have never been sanctioned by the international committee on nomenclature. There is, moreover, no great necessity for multiplying such terms. It is just as easy to say two megalines as two million Maxwells, or an induction of 15,000 lines as an "induction of 15,000 Gausses."

Why the "Oersted" as representing the magnetic reluctance of "one cubic centimetre of vacuum" should be introduced is also not very apparent. There is perhaps some excuse for the use of such terms in the fact that others have done so before, but the introduction of the term "activity" in substitution of the generally used and perfectly understood term "space factor" is surely quite superfluous. It will also puzzle the reader to say what a "water shield," a "stopped solenoid," and a "fringed insulation" are. Such technical terms may be convenient for a particular workshop as short instruction to the workman, but a scientific book is not the place to use them.

On the very important question of heating of coils the information given is rather meagre. All we are told on p. 299 is that a

"coil of ordinary dimensions may remain in circuit continuously when the applied electrical power does not exceed 0.50 watt per square inch of superficial radiating surface."

A curious statement is made on p. 184 as regards the time constant of two coils in parallel. The author says that it is only one-quarter of the value for the coils in series, but he has evidently overlooked the fact that although the inductance is quartered, the resistance is also quartered and therefore the time constant remains the same. GISBERT KAPP.

#### ANALYSIS OF WINE AND OTHER SPIRITUOUS LIQUORS.

*Traité complet d'analyse Chimique, appliquée aux essais industriels.* By Prof. J. Post and Prof. B. Neumann. Deuxième édition Française, traduite d'après la troisième édition allemande. By G. Chenu et M. Pellet. Tome Second. Troisième Fascicule. Pp. 497-916. (Paris: A. Hermann et Fils, 1910.) Price 13 francs.

THIS part of Post and Neumann's work deals with alcoholic beverages and some allied products. Chiefly it is concerned with wine and beer, and the original German text has been largely supplemented by details of the French practice in the chemical surveillance of these articles. Thus Gallicised, the work is of special interest for those concerned with its subject, inasmuch as it represents the experience of two great wine-making countries and of one, at least, famed also for its beer.

Dr. P. Kulisch, of Colmar, is responsible for the original section dealing with wines; but in view of the importance of the subject in France considerable additions have been made by the French translators. The result may therefore be taken to indicate the best practice in the two countries. At the outset are given the definitions of wines and the descriptions of usual manufacturing operations adopted by the International Congress for the Repression of Food Adulteration (Geneva, 1908, and Paris, 1909). Then follow directions for the chemical determinations required during the preparation and fermentation of the grape-juice, and the official methods prescribed in France and in Germany for the analysis of the fermented product. Detailed notice would be unprofitable here; it must suffice to say that full directions are given for appraising the various vinous constituents. Numerous illus-